

1 indicating that the analytical apparatus optionally can include a reactor, it does not appear reasonable
2 that one of ordinary skill in the art would have considered Manz's apparatus, which is intended for
3 chemical analysis, to be an obvious substitute for the chip reactors disclosed by Bard.

4 Second, the stacked plate apparatus disclosed by Manz is not equivalent to the simple stacked
5 plate reactor defined by applicants in their claims. The reactor defined by applicants in Claims 1 and
6 71 uses aligned openings in simple plates to achieve reactant pathways, a product pathway, a mixing
7 volume (Claim 71), *and a reaction volume*. The primary elements formed into the plates of Manz's
8 analytical device are openings 10, pipe pieces 9, and central chambers 12. Openings 10 and pipe
9 pieces 9 are clearly employed to direct fluid through the apparatus, while central chambers 12 are part
10 of a pump.

11 In FIGURE 2 of Manz, it appears that a first fluid and a second fluid each enter through
12 openings 10 on an upper plate. A pipe piece 9 on the second plate directs the fluid entering the
13 apparatus through the opening on the periphery of the top plate to a center opening in the second
14 plate, where the first and second fluids appear to combine. A portion of the combined fluids exits the
15 apparatus via central orifices in the lower two plates. Another portion of the combined fluids appears
16 to continue mixing in a pipe piece 9 in the third plate from the top, and then that portion of the
17 combined fluids exits the apparatus via openings on the periphery of the top two plates. It is
18 important to recognize that pipe pieces 9 are formed as *grooves* that do not penetrate the stacked
19 plates. Specifically, each of Manz's Figures, which illustrate a pipe piece 9, are drawn to indicate
20 that pipe pieces do not completely penetrate the plates. Also, the claim language employed by Manz
21 clearly refers to such pipe pieces as grooves (see Manz's Claim 1, second subparagraph, which states,
22 "...having a horizontally extending channel segment in the form of a groove..."). Significantly,
23 applicants' stacked plate reactor includes reaction volumes that are entirely defined by openings in
24 the plates, not by grooves. The pipe piece where the two fluids are combined thus cannot be
25 considered equivalent to applicants' recited reaction volume, because the pipe piece is a groove,
26 whereas applicants' reaction volume is defined in the claims as being an opening in a simple plate.

27 The Examiner appears to assert that central chamber 12 (which is defined by an opening in a
28 plate) is a reaction volume. However, Manz does not teach or suggest that central chambers 12 are
29 used as reaction volumes where mixed reactants are allowed to react to produce a product. Manz
30 clearly teaches that central chambers 12 are used (along with a diaphragm 24) as a pump (see

1 column 6, lines 42-54). In FIGURE 10 of Manz, it appears as if a first fluid enters a bottom plate (as
2 indicated by arrow 20) and moves upwardly through the device via openings 10 and pipe pieces 9, to
3 encounter a top face of diaphragm 24, and eventually exit via a top plate. A second fluid appears to
4 enter via the top plate (as indicated by arrow 22). The second fluid moves downwardly through the
5 apparatus via openings 10 and pipe pieces 9, to encounter a lower face of diaphragm 24. Manz
6 clearly describes arrow 22 as a pressure pipe employed to couple a source of pressure to
7 diaphragm 24 to drive the pump. Clearly, the first and second fluids do not mix or react in central
8 chambers 12.

9 Manz's analytical device cannot be equivalent to applicants' stacked plate reactor, because
10 Manz's device does not include a reaction volume defined by an opening in a simple plate. There is
11 simply no teaching or suggestion in the cited art to modify Manz's analytical apparatus to achieve
12 applicants' recited chemical reactor, notwithstanding that each device is generally fabricated from a
13 stack of plates. Nor is there any evidence that modifying Manz's apparatus to achieve applicants'
14 invention would solve a problem recognized by one of ordinary skill in the art. Thus the combination
15 suggested by the Examiner does **not** achieve an invention equivalent to applicants' claimed invention.

16 Claims 1 and 71 are distinguishable over the cited art because there is no evidence that one of
17 ordinary skill in the art would have been led to use Manz's analytical device as a reactor, and because
18 Manz's analytical device is not structurally equivalent to applicants' recited reactor. Thus, even if
19 Bard were modified in view of Manz and Agrafiotis, an invention equivalent to applicants' claimed
20 invention is not achieved. Accordingly, both Claims 1 and 71 define a novel and non-obvious
21 invention and are patentable over the cited art.

22 Because dependent claims are patentable for at least the same reasons as the claims from
23 which they depend, Claims 2-5, 9-14, 18, 20-24, 26, and 72-74 must also be patentable. Accordingly,
24 the rejection of Claims 1-5, 9-14, 18, 20-24, 26, and 71-74 under 35 U.S.C. § 103(a) as being obvious
25 over Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263), and further in
26 view of Agrafiotis et al. (U.S. Patent No. 5,463,564), should be withdrawn.

27 Rejection of Claims 6-8 under 35 U.S.C. § 103(a)

28 The Examiner has rejected Claims 6-8 under 35 U.S.C. § 103(a) as being obvious over Bard
29 (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263), further in view of
30 Agrafiotis et al. (U.S. Patent No. 5,463,564), and further in view of Ghosh (U.S. Patent

1 No. 5,961,932). The Examiner admits that the combination of Bard/Manz/Agrafiotis does not
2 disclose the recited capillary residence time chamber, but indicates that it would have been obvious to
3 incorporate similar elongate residence time chambers as taught by Ghosh.

4 Claims 6-8 depend on Claim 1, which for the reasons discussed above is distinguishable over
5 the combination of references suggested by the Examiner. Because dependent claims are patentable
6 for at least the same reasons as the claims from which they depend, Claims 6-8 are also patentable.
7 Accordingly, the rejection of Claims 6-8 under 35 U.S.C. § 103(a) as being obvious over Bard (U.S.
8 Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263), further in view of Agrafiotis et
9 al. (U.S. Patent No. 5,463,564), further in view of Ghosh (U.S. Patent No. 5,961,932), should be
10 withdrawn.

11 Rejection of Claims 16, 17, and 19 under 35 U.S.C. § 103(a)

12 The Examiner has rejected Claims 16, 17, and 19 under 35 U.S.C. § 103(a) as being obvious
13 over Bard (U.S. Patent No. 5,580,523), in view of Manz (U.S. Patent No. 5,250,263), further in view
14 of Agrafiotis et al. (U.S. Patent No. 5,463,564), and further in view of Ashmead (U.S. Patent
15 No. 5,534,328). The Examiner admits that the combination of Bard/Manz/Agrafiotis does not
16 disclose the heat transfer structures recited by applicants in these claims, but indicates that it would
17 have been obvious to incorporate similar structures, as disclosed by Ashmead.

18 Claims 16, 17, and 19 each depend on Claim 1, which as discussed above, is distinguishable
19 over the combination of references suggested by the Examiner. Because dependent claims are
20 patentable for at least the same reasons as the claims from which they depend, Claims 16, 17, and 19
21 are also patentable. Accordingly, the rejection of Claims 16, 17, and 19 under 35 U.S.C. § 103(a) as
22 being obvious over Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263),
23 further in view of Agrafiotis et al. (U.S. Patent No. 5,463,564), further in view of Ashmead (U.S.
24 Patent No. 5,534,328), should be withdrawn.

25 Rejection of Claims 75-77 under 35 U.S.C. § 103(a)

26 The Examiner has rejected Claims 75-77 under 35 U.S.C. § 103(a) as being obvious over
27 Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263). The Examiner
28 admits that Bard does not disclose a stacked plate reactor, but asserts that the stacked plate reactor
29 disclosed by Manz is an equivalent structure and therefore concludes that substitution of Manz's
30 stacked plate reactor for Bard's chip reactor would have been obvious. Applicants respectfully

1 disagree for the following reasons.

2 As noted above, Manz discloses an analytical device, and there is no evidence that supports a
3 conclusion that one of ordinary skill in the art would believed that Manz's device has use as a
4 chemical reactor in which two reactants are combined to form a product. Further, the device
5 disclosed by Manz does not include a structure equivalent to a reaction volume formed by an opening
6 in a plate, as recited by applicants' claims. Thus, even if combined as proposed by the Examiner,
7 Manz and Bard do not achieve an invention equivalent to applicants' claimed invention.
8 Accordingly, the rejection of Claims 75-77 under 35 U.S.C. § 103(a) as being obvious over Bard
9 (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263) should be withdrawn, since
10 these claims clearly are patentable over the cited art.

11 In consideration of the preceding remarks set forth above, it is apparent that all claims in the
12 present invention define a novel and non-obvious invention. Therefore, the Examiner is requested to
13 pass this case to issue at an early date. In the event that any further questions remain, the Examiner is
14 requested to telephone applicants' attorney at the number listed below.

15 Respectfully submitted,

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24 I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed
25 envelope as first class mail with postage thereon fully prepaid addressed to: Commissioner for Patents,
26 Alexandria, VA 22313-1450, on August 18, 2004.

27 Date: August 18, 2004
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